

Easy Pathology

— Dr. Abdelrahman Khalifa —

Chapter 6

Immunity



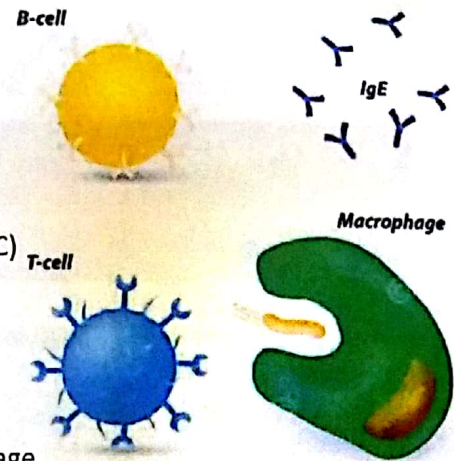
VISIT...

LANZAROTE
Caliente.COM

Immunity: Immune reaction able to eliminate infection

Mechanism of immunity:

- **Innate immunity:**
 - Surface epithelium
 - Inflammatory cells, & inflammatory proteins (Ig, C)
- **Adaptive immunity:** (mediated by APCs, & lymphocytes)
 - Humoral (B cells producing Ab)
 - Cellular:
 - Th1 CD4 → activates B cells or Macrophage
 - CD8 → Cytotoxic



Hypersensitivity: Exaggerated Immune reaction leading to pathological changes caused by reaction against antigen.

Antigen: Substance that can induce immune reaction. (*haptens* is incomplete antigen requiring another protein to be active).

Auto immune diseases

Immunological reaction against self Ag (loss of tolerance)

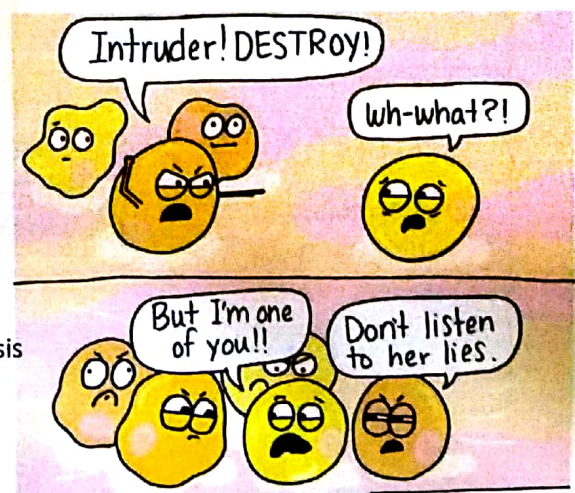
Pathogenesis:

Inheritance , Infections, or acquired factors leading to: death of memory cells

- Central Apoptosis of T cells and B cells in B.M. & Thymus
- Peripheral T-cell dysregulation

Types:

- **Thyroid :** Hashimoto – graves
- **Blood:** Autoimmune hemolytic anemia
- **CNS:** Multiple sclerosis, Autism
- **Liver:** Autoimmune hepatitis, 1ry Biliary cirrhosis
- **Muscle:** Myasthenia gravis
- **Pancreas:** Type I D.M.
- **Stomach:** Atrophic gastritis
- **Colon:** Ulcerative colitis
- **Systemic:** SLE , Rheumatic fever , Rheumatoid arthritis, Systemic sclerosis, polyarteritis nodosa



Hypersensitivity

	Type I immediate	Type II cytotoxic	Type III Immune-complex	Type IV delayed
Antigen	- Inhalation : pollens, mites - Ingestion : milk, egg - Insects bite	Fixed on cell (e.g. RBCs group)	Circulating antigen	Antigens of infective and Foreign body granuloma
Antibody	IgE	IgG, IgM with compelement	IgG, IgM with compelement	Cytokines No Ig
Pathogenesis	- 1st exposure : - B-cell → -Plasma cell formation -secretion of IgE -IgE fixed on mast cell - 2nd exposure : - Antigen react with IgE on top of mast cell -Mast cell release mediators Leads to: 1-Inflammation with excess eosinophils 2-Bronchospasm 3- Vasodilatation 4- mucosal secretion	-Antibody react with the cell membrane antigen → -complement activation → -cell lysis (e.g. Hemolysis of RBCs)	-Antibody react with circulating Antigen → -Formation of Ag-Ab complex in blood → - Immune complex deposition in blood vessel → - necrotizing Vasculitis - Fibrinoid necrosis	- T helper cell secrete : - IL2 → lymphocyte proliferation - IFN gamma → Activation of macrophage - Granuloma -Perivascular inflammation (e.g. syphilis)
Clinical diseases	Anaphylaxis : -generalized allergy Atopy : -Hay fever -Asthma -Urticaria	- ABO incompatibility - A.I. hemolytic anemia - Good pasture Anti GBM Ab.	- SLE - Serum sickness - Acute GN - Arthus reaction:	- Granulomas - Graft rejection - Contact dermatitis



Anaphylaxis

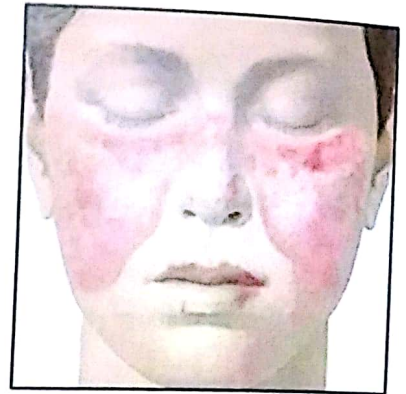


Serum sickness

Systemic Lupus Erythematosus (SLE)

Autoimmune diseases affecting multiple organs, more common in females

Female > male (9:1), affecting middle age



Aetiology

- Genetic factor
- **U.V.** → apoptosis of epidermal cells → formation of nuclear Ag
- Drugs (hydralazine)
- Female sex hormone

Pathogenesis

Formation of **Auto Ab** (Anti nuclear ANA, AntiDNA, Anti smith) → **type III hypersensitivity** (discuss) → vasculitis, fibrinoid necrosis & tissue necrosis

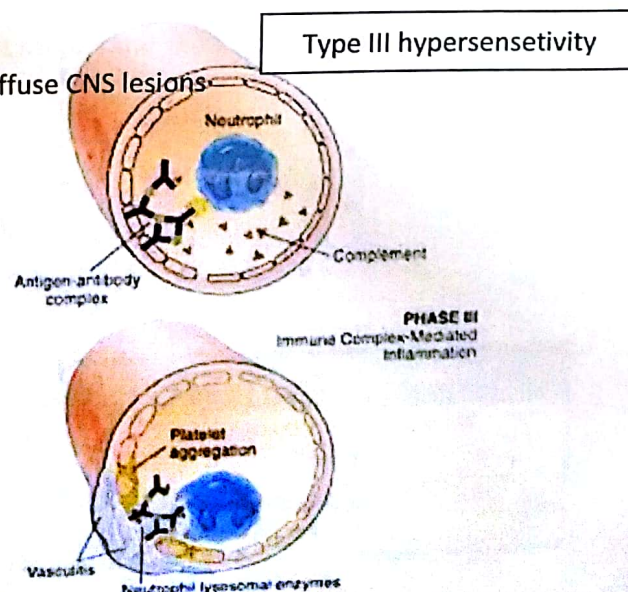
Pathological features:

- CNS → Neuropsychiatric disorders
- Skin → Malar (**butterfly** rash), exaggerated with U.V.
- Heart → **Endocarditis** & vegetations (*Libman sack endocarditis*), pericarditis
- Serous sacs → S.F. inflammation
- Vessels → necrotizing vasculitis
- Kidney → Lupus nephropathy & G.N. → **Renal failure** is the common cause of death
- Splenomegaly (hyperplasia of follicles + arteriolar fibrosis '**onion skin**')
- Joints → **Arthritis** (Synovitis)

Diagnosis:

- Clinical
- Lab: Auto antibodies (elevated ANA, low levels of complement)
- Renal biopsy & urine sample (hematuria & proteinuria)
- Renal function for **follow up**

Causes of death: Renal failure – Infections – diffuse CNS lesions



Amyloidosis

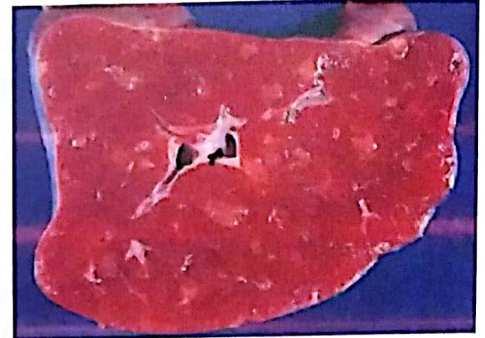
Extracellular accumulation of abnormal homogenous eosinophilic abnormal amyloid protein.

Composition: Glycoprotein (5%) + Fibril protein (95%) nonbranching, misfolded, insoluble

- **AL** (Amyloid light chain): secreted by Plasma cells (Light chain Ig)
- **AA** (Amyloid associated) : Present in serum, secreted by liver
- **Transthyretin** found in Senile Amyloidosis, & familial neuropathy
- **Beta2 mgb** in prolonged hemodialysis
- **Beta Amyloid** in Alzheimer, & medullary carcinoma

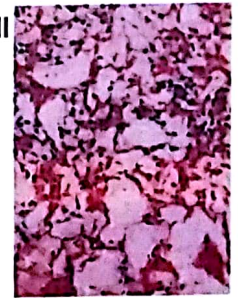
Gross:

- **Stain:** Blue (with iodine + 1% H₂SO₄)
- **Size:** increased
- **Shape:** sharp borders
- **Color:** waxy, pale brown deposit
- **Consistency:** firm



Microscopic:

- **Deposit:** Homogenous, glossy, eosinophilic, in CT, and Blood vessel wall
- **Staining of amyloid:**
 - H&E → pink
 - Congo red → orange red → green with polarized light



Renal amyloidosis:

The most commonly affected organ. Deposits are seen in:

- Arterioles → ischemia → R.F. & hypertension
- Glomeruli → proteinuria → Nephrotic syndrome

Liver amyloidosis: Deposits are seen in sinusoids & space of diss → hepatomegaly

Intestinal amyloidosis: In the basement membrane → malabsorption

Cardiac amyloidosis:

- Deposits are seen Interstitial between muscle fibers
- Restrictive cardiomyopathy in late stages

Splenic amyloidosis:

	Sago Spleen	Diffuse amyloidosis
Microscopic	Deposits in central arterioles & follicles (white pulp)	Deposits affect sinusoids (red pulp)
Gross	-Moderate enlargement -waxy nodules	-Marked enlargement -Waxy cut section

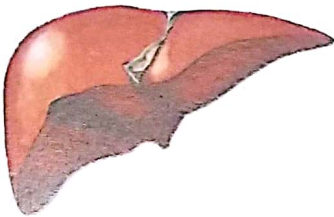
Types of Amyloidosis:

- **Localized** (deposit in single organ)
 - Thyroid *medullary carcinoma*
 - Senile Cardiac amyloidosis
- **Systemic** (circulate in blood & deposit in multiple organs)
 - **Primary: (AL)**



- **Multiple Myeloma** (plasma cell tumor)
- **Pathogenesis:** malignant plasma cell → AL protein → circulate in blood → deposit in organs
- **Organs affected :** Kidney, heart, GIT, Nerves ...etc.
- Bence – jones protein in urine

- **Secondary: (SAA)**



- **Aetiology:** (chronic destructive diseases)
 - Chronic suppuration (e.g. Lung abscess)
 - Chronic granuloma (e.g. T.B)
 - Autoimmune diseases (e.g. Rheumatoid)
 - Cancers (Hodgkin Lymphoma)
- **Pathogenesis:** Chronic destructive disease → macrophage accumulation and stimulation → secrete Cytokines (CK) → circulate in blood → affect Liver → Liver secrete (AA) → circulate in blood (SAA) → deposit in multiple organs
- **Organs affected :** Kidney, heart, GIT, Spleen, Liver
- **Cause of death :** Renal failure

- **Hemodialysis-associated**

- (B2 mgb) → carpal tunnel syndrome

- **Hereditary**

- Familial Mediterranean Fever:
- Familial polyneuropathy

Prognosis of amyloidosis :

Poor in systemic Amyloidosis (R.F., H.F.)

Poor in 1ry amyloidosis (requires chemotherapy)

1-The commonest and most serious form of organ Amyloidosis is :

- a) Hepatic b) Pancreatic
c) Renal d) Splenic

2-Deposits of Amyloid in tissues can be diagnosed by the following stain:

- a)Osmic acid b)Sudan III
c)Masson trichrome d)Congo Red

3-Amyloid deposits are commonly seen :

- a) Intracellular perineuclear b) Intracytoplasmic
c) Glandular Intraluminal d) Extracellular

4 -2ry Amyloidosis is mostly follows:

- a) T.B.
- b) Chronic lung abscess
- c) Rheumatoid arthritis
- d) All of the above

5 -AL protein is typically found in:

- a) Hyalinosis b) Multiple myeloma
c) AL amyloidosis d) Localized Amyloidosis

6-Immediate hypersensitivity reaction is mediated by:

- a) IgM b) IgE
c) IgA d) none of the above

7-Delayed hypersensitivity reaction is mediated by:

- a) IgM b) IgE
c) IgA d) none of the above

8-All the following are examples of Type III hypersensitivity EXCEPT:

- a) SLE b) Post streptococcal Glomerulonephritis
- c) Arthus reaction d) Sarcoidosis

9-Serum sickness is mediated by:

- a) Anti cell membrane antibody b) Immune complex deposition
c) Mast cell degranulation d) delayed Cell mediated immunity

10- Which of the following is multisystemic autoimmune disease:

- a) Rheumatic fever b) Rheumatoid arthritis
c) SLE d) All of the above

11- Which of the following immune reactions are seen in Shistosomiasis:

- a) Type I hypersensitivity
- b) Type IV hypersensitivity
- c) all of the above
- d) none of the above

12- Ulcerative colitis is an example of:

- a) Type I hypersensitivity
- b) Type IV hypersensitivity
- c) Autoimmune disease
- d) All of the above

13- Immune reaction in ABO incompatibility includes:

- a) Antibody fixed on mast cell
- b) Antigen as a part of cell membrane
- c) Immune complex deposition
- d) Bypass of tolerance

14- All are autoimmune diseases EXCEPT?

- a) Hashimoto's thyroiditis
- b) Ulcerative colitis
- c) Arthus reaction
- d) Good pasture's disease

15- All of the following mechanisms are included in Autoimmune diseases EXCEPT:

- a) Cytotoxic hypersensitivity reaction
- b) Immune complex deposition
- c) Anti Basement membrane antibodies
- d) IgE mediated hypersensitivity

16- Fibrinoid necrosis represents:

- a) Breakdown of fibrin
- b) Fibrin deposition
- c) Anaphylaxis
- d) Hypersensitivity type III

17- Anaphylaxis is best described as:

- a) Generalized hypersensitivity type I
- b) Autoimmune disease
- c) Localized Hypersensitivity
- d) Allergic dermatitis

13- All the following features are found in Atopy EXCEPT:

- a) Mucous secretion
- b) Tissue necrosis
- c) Eosinophils
- d) Allergic vasculitis

14- Renal function is impaired in longstanding

- a) Hodgkin lymphoma
- b) Rheumatoid arthritis
- c) T.B.
- d) all

15- Follow up of systemic lupus requires

- a) ANA
- b) Renal function
- c) IgE measurement
- d) Non

Cases1:

A young girl is complaining of chest pain during inspiration, Pink discoloration of cheeks & nasal skin. Urine analysis revealed proteinurea. Serum ANA level is elevated.

- 1-Diagnosis
- 2-Explain chest pain
- 3-Pathogenesis
- 4- What is the aim of follow up ?

Cases2:

Old female with history of rheumatoid artheritis. She came with periorbital edema and lower limb edema.

- 1-Diagnosis
- 2-What is the aim of biopsy & stain required?
- 3-Pathogenesis of edema
- 4- List other expected systemic complications ?

Cases3:

Old male is complaining of pulmonary TB for more than 2 years. Now he has generalized edema and proteinurea. Both kidneys are enlarged.

- 1-Diagnosis
- 2-Gross & microscopic picture of the kidney?
- 3-Fate ?